
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Ahtanum Creek Watershed Assessment

BPA project number: 9901300

Contract renewal date (mm/yyyy):

☒ Multiple actions?

Business name of agency, institution or organization requesting funding

Yakama Indian Nation

Business acronym (if appropriate)

YIN

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

7.6A, 7.6B, 7.6C, 10.5A

FWS/NMFS Biological Opinion Number(s) which this project addresses

Not applicable

Other planning document references

See Strategies 2-9 for spring chinook and 2-7 for steelhead, Yakima River Sub-Basin Plan, 1990. Also see Wy Kan Ush Mi Wa Kish Wit, Yakima River Sub-Basin Plan, basinwide recommendations 3-5, pp. 58-59.

Short description

Conduct watershed assessment in the agricultural portion of the Ahtanum Creek watershed to complete assessment of the entire watershed, facilitate restoration of salmon and steelhead, and protect bull trout.

Target species

Steelhead (Mid-Columbia ESU), bull trout (Threatened, 6/10/98), spring chinook, coho

Section 2. Sorting and evaluation

Subbasin

Lower Mid-Columbia; Yakima River, Ahtanum Creek

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more	If your project fits either of these	Mark one or more categories

caucus	processes, mark one or both	
<input checked="" type="checkbox"/> Anadromous fish	<input type="checkbox"/> Multi-year (milestone-based evaluation)	<input type="checkbox"/> Watershed councils/model watersheds
<input checked="" type="checkbox"/> Resident fish	<input checked="" type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Information dissemination
<input type="checkbox"/> Wildlife		<input type="checkbox"/> Operation & maintenance
		<input type="checkbox"/> New construction
		<input checked="" type="checkbox"/> Research & monitoring
		<input checked="" type="checkbox"/> Implementation & management
		<input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20547	Yakima Subbasin Habitat/Watershed Project Umbrella
9603501	Satus Watershed Restoration
9803300	Restore Upper Toppenish Creek Watershed
9705300	Toppenish-Simcoe Instream Flow Restoration and Assessment
9206200	Yakama Nation Riparian/Wetlands Restoration
9705100	Yakima Basin Side Channels
9705000	Little Naches Riparian and In-Channel Restoration
9803400	Reestablish Safe Access Into Tributaries of the Yakima Subbasin
9901300	Ahtanum Creek Watershed Assessment
20117	Yakima River Subbasin Assessment (new)

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
8812008	Fisheries Technician Field Activities	Will help to monitor success of habitat restoration and supplementation by continuing to survey Ahtanum Creek for coho redds.
9603302	Yakima River Coho Restoration-O&M	Although this is not a supplementation project, coho released under this project are spawning in Ahtanum Creek and can be expected to utilize additional habitat when actions proposed under this project are put in place.
9105700	Yakima Phase II Screen Fabrication	Substantial BPA investments have been made in fish passage facilities in Ahtanum Creek and in the Yakima River downstream from Ahtanum Creek. It is important to address the flow and habitat obstacles to salmon and steelhead production that remain
9200900	Yakima Phase II Screen O&M	Substantial BPA investments have been made in fish passage facilities in Ahtanum Creek and in the Yakima River downstream from Ahtanum Creek. It is important to address the flow and habitat obstacles to salmon and steelhead production that remain
9503300	Yakima Fish Protection, Mitigation and Enhancement Facilities	Substantial BPA investments have been made in fish passage facilities in Ahtanum Creek and in the Yakima River downstream from Ahtanum Creek. It is important to

		address the flow and habitat obstacles to salmon and steelhead production that remain
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Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1998	Began measuring discharge in key stream and diversion locations to begin water budget assessment.	
1998	Completed cursory investigations of salmonid presence/absence, species, age-structure	

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Map irrigation systems utilizing creek water	a	incorporate GIS coverages, orthophotos, district maps into overall Project GIS
1		b	add delivery and drainage system features
1		c	add cropping patterns from crop reports
1		d	ground-truth map data
2	Model irrigation water use	a	measure water withdrawals from and returns to Ahtanum Creek
2		b	assess consumptive use and irrigation efficiency
3	Describe streamflow and water temperature regime	a	measure creek flow and temperature regime over time and distance
3		b	develop descriptive model of flow by location and season
4	Survey creek channel and floodplain	a	conduct qualitative assessment of riparian functional status
4		b	use current and historic aerial photographs to map channel width and sinuosity, riparian vegetation and trends in these features over time
5	Describe fish population response to habitat changes	a	assess potential salmon and steelhead production (pre-development conditions) as well as extent of bull trout in creek
5		b	describe response to changes in water withdrawal, return flows and riparian management
6	Recommend changes in irrigation facilities and management of land and water resources	a	integrate information and recommendations from upper watershed analysis
6		b	use above data to produce Assessment document and recommend changes in irrigation and floodplain management
7	Implement recommendations	a	system modifications, water substitution, land purchase or lease

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1998	9/2000			20.00%
2	10/1998	9/2000			25.00%
3	10/1998	9/2000			20.00%
4	3/1999	9/2000			15.00%
5	3/1999	9/2000			10.00%
6	6/1999	9/2000		Completion of Assessment document	10.00%
7	10/1999	9/2004			0.00%
				Total	100.00%

Schedule constraints

Field data collection may be constrained by weather, private property access; a proposed off-channel reservoir project could complicate implementation, but could provide valuable information sharing opportunities

Completion date

2000 (for competent data collection and watershed analysis). Implementation will follow in FY2001

Section 5. Budget

FY99 project budget (BPA obligated): \$150,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	.5 FTE Fsh Bio (lead), .5 FTE Wld Bio, .25 FTE Hydro, 1 FTE Bio/GIS Spec, 1.5 FTE Tech II, .5 FTE OA	% 54	\$129,279
Fringe benefits	25.3%	% 14	\$32,708
Supplies, materials, non-expendable property	Misc field supplies, Office supplies	% 3	8,000
Operations & maintenance	Vehicle insurance, rental and mileage; utilities, office space rental, repairs and maintenance	% 7	\$17,500
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		% 0	0
NEPA costs	NA, this is an assessment	% 0	0
Construction-related support	0	% 0	0
PIT tags	# of tags: 0	% 0	0
Travel	Includes training, per diem	% 1	\$2,000
Indirect costs	23.5%	% 19	\$45,704
Subcontractor	Irrigation consultant	% 2	\$5,000
Other		% 0	

TOTAL BPA FY2000 BUDGET REQUEST	\$240,191
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Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$240,191

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$180,000	\$150,000	\$80,000	\$60,000

Section 6. References

Watershed?	Reference
<input checked="" type="checkbox"/>	Dominguez, L. 1997. Ahtanum watershed analysis including Cowiche, Foundation Creek and Darland Mountain WAUs. Appendix F: Fish habitat analysis. WA State Department of Natural Resources, Olympia, WA. 59 pp.
<input type="checkbox"/>	Foxworthy, B. 1962. Geology and ground-water resources of the Ahtanum Valley, Yakima County, Washington. U.S. Geol. Surv. Water Supply Paper 1598. 100 pp + map.
<input type="checkbox"/>	Tuck, R. L. 1993. History and status of anadromous salmonids in Ahtanum Creek, Washington. Eco-Northwest, Granger WA. 62 pp.
<input type="checkbox"/>	Columbia River Inter-Tribal Fish Commission (CRITFC). 1995. Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon): the Columbia River anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes, Volume I. CRITFC, Portland, OR.
<input type="checkbox"/>	CRITFC. 1995. Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon): the Columbia River anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes, Volume II-Subbasin Plans. CRITFC, Portland, OR.
<input type="checkbox"/>	Yakama Indian Nation. 1990. Yakima River Subbasin Salmon and Steelhead Production Plan. Columbia Basin System Planning, Portland OR.

PART II - NARRATIVE

Section 7. Abstract

Ahtanum Creek was historically important for production of salmon and steelhead. The creek and its southernmost tributaries form part of the north boundary of the Yakama Indian Reservation. Spring chinook and coho are found in small numbers today; there is no current information on steelhead presence. Bull trout have been found as far downstream as the lowermost major irrigation diversion.

A watershed analysis for the upper, forested portion of the watershed is nearing completion. Water withdrawal, diking and channelization, grazing practices and residential development on the floodplain adversely affect the lower, largely agricultural portion of the watershed. Restoration of significant salmon and steelhead production in the watershed can be accomplished, but science-based strategies are needed for protecting stream flow, stream channels and floodplains.

We propose to map irrigated lands and water delivery systems, measure water discharge and temperature, compare water diversion and loss with on-farm water needs, and estimate the efficiency of irrigation water conveyance and use. At the same time we will gather historic and current data on stream channel condition, riparian function and salmonid populations.

We will use this information to determine how water use and riparian management in lower Ahtanum Creek may be limiting production of anadromous salmonids in the watershed as a whole, and to determine the most effective measures for salmon and steelhead restoration. After completing data analyses and the Assessment document in FY2000, we will recommend restoration measures that could include improved irrigation facilities, land and water management changes, and purchase or lease of land and water rights.

This project serves to further the goals of the FWP, especially by meeting habitat goals, policies and objectives (7.6A-C), and studying and evaluating bull trout populations. Columbia River basin bull trout were listed as Threatened on June 10, 1998.

Section 8. Project description

a. Technical and/or scientific background

Physical Setting Ahtanum Creek drains a 171-square mile watershed (Foxworthy, 1962), discharging into the Yakima River just south of the city of Yakima (Figure 1).

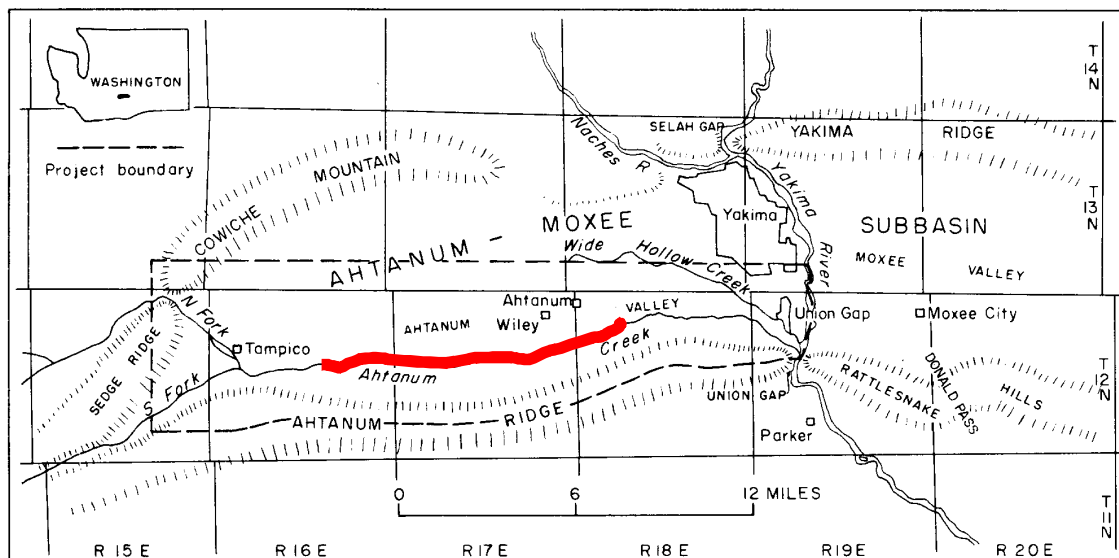


Figure 1. Ahtanum Creek Project area and vicinity map (reproduced from Foxworthy, 1962). Highlight indicates dry reach, June through October.

The creek and its southernmost tributaries form part of the north boundary of the Yakama Indian Reservation. The North and Middle Forks of Ahtanum Creek originate on 7,000-foot Darland Mountain 30 miles west of Yakima, and join the smaller South Fork at Tampico 15 miles west of Yakima to form Ahtanum Creek proper. The Ahtanum Creek watershed is about $\frac{1}{4}$ the size of the neighboring Toppenish Creek and Satus Creek watersheds. However, gage records show that its annual runoff is over half that of the other two watersheds, and its late-summer base flow upstream from irrigation diversions may exceed those of either Toppenish Creek or Satus Creek over comparable periods of record. Higher watershed elevation and possibly geologic factors may account for Ahtanum Creek's greater base flow, which in turn suggests significant potential for rearing salmon and steelhead.

Fisheries Resources Salmon and steelhead once migrated in large numbers to Ahtanum Creek. Large fisheries on what must have been chinook salmon and steelhead were described by Catholic missionaries in the 1850s, and the Yakima Indian agent in 1867 mapped five traditional fishing sites on

Ahtanum Creek and its North Fork (Tuck 1993). Anadromous runs declined with the advent of large-scale irrigation. At present, reintroduced coho are spawning in the lower mile of Ahtanum Creek, and juvenile chinook have been observed near the mouth of the creek. At this writing, over 70 coho redds have been identified in the lower reaches of Ahtanum and Wide Hollow creeks. An estimated 4,000 coho were estimated to have returned to the Yakima subbasin to spawn in fall, 1998 (B. Bosch, YIN Assistant Harvest Manager, personal communication). There is no recent information on steelhead in Ahtanum Creek.

Rainbow, cutthroat and bull trout are found in all three forks of Ahtanum Creek (Dominguez 1997; J. Matthews, YIN, pers. comm.). In the summer of 1992 a 12-inch bull trout was captured by a WDFW biologist in a pool below the Bachelor-Hatton diversion dam, which is a short distance downstream from the Ahtanum Main diversion. This suggests that Ahtanum bull trout may have fluvial traits, venturing at least four miles down the mainstem and past three major diversion dams during the irrigation season.

Irrigation Development The earliest records of irrigation in Washington come from the mission settlement along Ahtanum Creek in the 1850s. By the 1870s riparian lands were extensively irrigated, especially on the north (off-reservation) side of the creek. An Indian agent reported in 1891 that irrigation by whites had depleted Ahtanum Creek of water for supporting fisheries (Tuck 1993). Over-appropriation of Ahtanum Creek thus goes back more than a century.

In 1908 an out-of-court settlement allocated $\frac{3}{4}$ of the flow of Ahtanum Creek to north-side users, but in 1964 a federal circuit court decision in *United States of America v. Ahtanum Irrigation District* reduced the maximum flow that could be diverted north and allocated all flows that could be beneficially used to the south- (Reservation-) side users after July 10 each year. The postwar development of groundwater resources observed by Foxworthy (1962) accelerated after the 1964 decision as north-side users sought to replace water diverted from their lands.

Today three districts encompass about 8,000 acres of land irrigated from Ahtanum Creek. The creek is dried up from June through October for several miles below the two largest diversions. During the off-season, creek water is turned into north-side canals (actually tributaries of Ahtanum Creek) to recharge the alluvial aquifer. The flow of Ahtanum Creek is therefore depleted by both surface diversions and well pumping.

The WA State Legislature granted Ahtanum Irrigation District funding in 1998 to evaluate the construction feasibility of the Pine Hollow Reservoir Project, an off-channel irrigation impoundment. A possible feature of this project could be instream flow augmentation to the reach previously described that dewatered annually. YIN staff are currently developing a scope of work and drafting a contract with the WA State Department of Ecology to perform biological and cultural assessments of lands and water associated with the Pine Hollow project. Although this project could complicate management issues, there exists the possibility for substantial information sharing.

The Ahtanum Main Canal, which serves most of the Reservation lands irrigated from Ahtanum Creek, was screened in 1930, but this screen fell into disrepair. In the last few years, fish screens have been constructed by the Bureau of Reclamation with Bonneville funds at the four largest irrigation diversions in the Ahtanum Creek drainage. This project (9107500) eliminates the most significant cause of smolt mortality at these four locations.

The Ahtanum Creek watershed is part of the current Yakima River Basin adjudication process, *Department of Ecology v. Acquavella et al.*, which began in 1977. The presiding judge, in his March 1, 1995 final order regarding treaty reserved water rights decreed that the Yakama Indian Nation has a time-immemorial yet diminished right for instream flow "necessary to maintain fish life" in Ahtanum Creek, as determined by the Bureau of Indian Affairs. The BIA has delegated its trust responsibility regarding fisheries management to the Yakama Indian Nation, and would look to the YIN for advice on instream flows. The U.S. Fish and Wildlife Service and the Yakama Nation have modeled habitat-discharge relationships using IFIM for three locations along Ahtanum Creek, but instream flow requirements have not been established at this writing.

Other Issues The broad irrigated floodplain surrounding the lower 30 miles of Ahtanum Creek is heavily grazed by livestock. Exurbia is encroaching on the Ahtanum valley as well, bringing its own problems of groundwater use, pesticides and septic effluents. Since the 1996 flood in the Ahtanum Valley, citizen pressure to channelize and dike Ahtanum Creek has increased. Such unconfined stream reaches are critically important, however, in detaining floodwaters while providing habitat for juvenile salmonids and a variety of wildlife species.

A Washington Department of Natural Resources-sponsored watershed analysis is nearing completion for the North and Middle forks of Ahtanum Creek upstream from the irrigated area. This analysis, developed by landowners, resource agencies and the Yakama Nation, prescribes measures to reduce mass wasting and erosion/deposition, and to increase shading and wood recruitment to creek channels. A complementary assessment tailored to downstream problems is needed to begin to restore fish and wildlife populations in the whole Ahtanum watershed.

A consequence of non-funding for this project is the non-completion of a watershed assessment in a part of the basin where one is vitally needed. As previously mentioned, an upper watershed assessment is practically complete. Our efforts would provide for a total assessment of a watershed that currently supports fisheries values important to the Yakama people, and the general public.

b. Rationale and significance to Regional Programs

The long-term goal of the Yakama Indian Nation is to restore salmon and steelhead to harvestable levels, while maintaining the genetic integrity and adaptability of populations. The Yakima Subbasin Plan outlined in Volume II, *Wy-Kan-Ush-Mi Wa-Kush-Wit*, establishes an adult spring chinook return goal of 26,300 compared to an average of 4270 for 1986-1990 in the entire Yakima subbasin. The summer steelhead adult return goal is 29,700 compared to 2150 for 1985-90 in the subbasin. This will involve restoring terrestrial and aquatic habitat to conditions capable of supporting all freshwater life history stages of summer steelhead.

FWP 7.6A Habitat Goal: Protect and improve habitat conditions to ensure compatibility with the biological needs of salmon, steelhead and other fish and wildlife species. Pursue the following aggressively.

7.6A.1 Ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive management basis.

This project is the first attempt at objective fact gathering with the intent of restoring anadromous fish populations in Ahtanum Creek. The fisheries habitat problems in the Ahtanum Creek watershed are complex, and we intend to use watershed analysis as a framework for ensuring that future actions are complementary and effective.

The Yakama Nation is currently developing techniques under the Toppenish-Simcoe Project (see below), which will be applied to the Ahtanum watershed. The first four objectives listed in 7b. below address steps 3 and 4 of the Federal process. This structure reflects the fact that general characterization and identification of issues and key questions has already occurred. The NPPC's Yakima Subbasin Plan, locally-derived RASP (Regional Assessment of Supplementation) models, and documents developed in the *Department of Ecology v. Acquavella et al.* case all support the assumption that irrigation withdrawals followed by floodplain development are the major issues that would drive analysis of the mainstem reach of Ahtanum Creek.

This project builds on efforts in adjacent watersheds. The Yakama Indian Nation, through its part in the Yakima River Basin Water Enhancement Project, and by implementing the Satus Creek Watershed Restoration Project (9603501) and the Toppenish-Simcoe Instream Flow Restoration Project (9705300) has acquired equipment and expertise in water and fisheries monitoring that will be useful to this project. An

overriding goal of each of these projects is to decrease watershed fragmentation and provide for connected systems which more closely mimic natural watershed hydrologic function, species assemblages, vegetation, and cultural values.

7.6A.2 At a minimum, maintain the present quantity and productivity of salmon and steelhead habitat. Then, improve the productivity of salmon and steelhead habitat critical to recovery of weak stocks. Next, enhance the productivity of habitat for other stocks of salmon and steelhead. Last, provide access to inaccessible habitat that has been blocked by human development activities.

Ahtanum Creek is part of the historical range of Yakima spring chinook. The creek could provide additional habitat as the population expands geographically under the supplementation program begun by the Yakima Fisheries Project (8812001 et al.) with broodstock collection in 1997. Good-quality spawning and rearing habitat is available upstream from the agricultural part of the Ahtanum Creek watershed, but it is necessary to reconnect upper and lower Ahtanum Creek so spring chinook can ascend the creek. Coho already use the lower mile of Ahtanum Creek where upwelling keeps flow perennial in spite of the upstream diversions.

The Yakima/Klickitat Fisheries Project may not rear steelhead in the foreseeable future; managers will have to rely on habitat improvement to boost juvenile survival rates. The Ahtanum Creek watershed is contiguous with the Satus Creek and Toppenish Creek watersheds that together produce about half of all Yakima Subbasin steelhead. Besides its proximity to Satus and Toppenish creeks, Ahtanum Creek, as discussed earlier, has natural flow characteristics more suitable for supporting stream-type juvenile life histories characteristic of steelhead, spring chinook and coho. The Phase II screening projects also discussed earlier are predicated on the restoration of anadromous salmonid populations in Ahtanum Creek.

10.5A Study and Evaluate Bull Trout Populations

The YIN has made no concerted effort in the past to address the status and extent of bull trout in Ahtanum Creek, primarily due to lack of manpower and equipment. The work of other private, state and federal entities has shown relatively well the status of bull trout in the upper Ahtanum watershed. This project, along with work soon to be performed in relation to the Pine Hollow Reservoir project, should do much to extend our knowledge of bull trout in the lower, agricultural portions of Ahtanum Creek and its tributaries. In addition, a Biological Assessment currently underway in the Yakima subbasin could benefit from the efforts of this project.

c. Relationships to other projects

The Yakima Subbasin Habitat/Watershed Project Umbrella discusses the general, conceptual relationships of projects in the Yakima Subbasin. This Umbrella also discusses the interdependence of these projects with the Yakima/Klickitat Fisheries Project. More specifically, this project is related through various FWP measures in the following BPA projects:

9705300 Toppenish-Simcoe Instream Flow Restoration and Assessment Knowledge and experience base of 9705300 will improve management and data collection efforts of project covered under this proposal. Both projects share similar goals and objectives.

9603501 Satus Watershed Restoration Project covered under this proposal will benefit from sharing of resources.

9206200 Yakama Nation Riparian/Wetlands Restoration This project has developed a land acquisition and management system that will benefit the project covered under this proposal in future years.

In addition to the BPA funded projects described above, this proposed project could be directly related to the following US Bureau of Reclamation activity:

Yakima River Water Enhancement Project Water conservation planning sections of this project could improve irrigation efficiency and fish habitat in reaches of Ahtanum Creek covered under this proposal.

d. Project history (for ongoing projects)

At this writing, FY99 funds have not been received. However, field and professional staff from the Toppenish-Simcoe Instream Flow Restoration Project (BPA-9705300) have begun measuring stream and canal discharges. In addition, these personnel have completed cursory surveys of the channel and floodplain, in addition to sampling reaches of Ahtanum and its tributaries for salmonids. Other YIN Fisheries Program personnel have surveyed the lower reaches of Ahtanum and Wide Hollow this fall for spawning coho.

e. Proposal objectives

1. Map irrigation systems.
2. Model irrigation water use.
3. Describe stream flow and water temperature regime.
4. Survey channel and floodplain.
5. Describe fish population responses to habitat changes.
6. Recommend changes in irrigation facilities and management of land and water resources.
 - *Product:* Assessment document
7. Implement recommendations.

f. Methods

1. *Map irrigation systems.* Develop map from existing Yakama Reservation and Yakima County GIS coverages, orthophotos and irrigation district maps. Add irrigation district delivery and drainage system features from other sources such as aerial photographs. Use district crop reports, data compiled for current surface water adjudication, and aerial photographs to add cropping patterns to map.
2. *Model irrigation water use.* Measure surface water withdrawals (irrigation water supply) from Ahtanum Creek and return flows (irrigation system spills and runoff) to Ahtanum Creek. Incorporate all available gaging records. Use withdrawal data and cropping information to assess consumptive use and irrigation efficiency.
3. *Describe stream flow and water temperature regime.* Measure creek flow and temperature over time and distance, with sufficient spatial resolution to detect significant seepage gains and losses. Incorporate all available gaging records. Develop a descriptive model of creek flow by location and season.
4. *Survey channel and floodplain.* Utilize the qualitative Proper [riparian] Functioning Condition assessment method developed by the Bureau of Land Management, adding channel measurements if practicable. Also use current and historical aerial photographs to map channel width and sinuosity, riparian vegetation and trends in these features over time. The most intensive of these techniques will be applied to random segments of the creek rather than the entire mainstem.
5. *Describe fish population responses to habitat changes.* Assess potential (pre-development) salmon and steelhead production. Describe response to changes in water withdrawal, return flows and riparian management under different restoration scenarios. Utilize available modeling techniques such as IFIM (IFIM has been locally calibrated wrt three locations on Ahtanum Creek) and the Ecosystem Diagnostic and Treatment Planning Model currently under development for the Yakima subbasin.
6. *Recommend changes in irrigation facilities and management of land and water resources.* Produce Assessment document, recommend changes in irrigation and floodplain management using data developed and refined in this project, working with the Yakama Tribal Council, Wapato Irrigation

Project (Bureau of Indian Affairs), Washington Departments of Ecology and Fisheries and Wildlife, north-side irrigation districts and Bonneville Power Administration.

7. *Implement recommendations.* System modifications, substitution, land purchase or lease will take place beginning in FY2000.

Project cost, relative to a more cursory analysis, reflects the need for new information on (1) effects of surface diversions, return flows and well pumping on instream flow and temperature, and (2) changes in channel and floodplain conditions over the past half-century. More specific information will enable managers to go beyond lamenting problems, and set priorities for specific restoration actions.

Factors that could limit project success include inclement weather and off-Reservation property access problems. Of course the ultimate success of this project hinges on implementation of the management recommendations. The affected entities do not have a history of cooperation, and all parties to the current adjudication are making their best case for rights to irrigation water. This is, however, an advantageous time for change given the new level of cooperation for management of the upper watershed, the possibility of salmon and/or steelhead listing under ESA, and the large overall effort to increase natural production of salmon and steelhead in the Yakima subbasin.

g. Facilities and equipment

After receipt of FY99 funds, a GIS desktop and field notebook computer will be purchased. Certain stream surveying and discharge measuring (Marsh-McBirney vel meter) equipment will also be purchased.

FY2000 funding will support the rental of 1 4WD pickup and its associated costs (insurance, mileage, maintenance, office space rental and utilities, and miscellaneous field gear and office supplies). We will use equipment and resources from other projects, when possible, to minimize cost.

h. Budget

Personnel

Includes 2.25 FTE professional staff, 1.5 FTE field technicians, 0.25 FTE bookkeeper and 0.25 FTE office assistant. The professional staff directs field data acquisition, statistically analyzes hydrologic and biological data, develops GIS maps, reports on project findings and develops the management plan. Technicians are responsible for most field data gathering including discharge measurement, stream and fish surveys, and field data entry. The bookkeeper and office assistant handle purchasing paperwork, budget tracking and projections, and financial reporting.

Fringe Benefits

This standard item is 25.3% of the personnel item.

Supplies, Materials etc.

Includes a computer (PC) to speed GIS analysis by ending reliance on shared equipment. It also includes miscellaneous field and office supplies.

Operations and Maintenance

Includes rental, mileage charges and insurance for two GSA vehicles for field work, repairs and maintenance on project equipment and rental of office space and utilities.

Capital Acquisitions etc.

Based on purchase of 80 acres of land at \$650/acre (one of the water-conservation options expected in the management plan), but could include capital improvements to conserve or substitute irrigation water.

Travel

Includes per diem and related fees for travel to project-related conferences or training.

Indirect Costs

This standard item is 23.5% of all budget items except capital acquisitions.

Subcontractor

Includes services provided to the project by irrigation engineers to analyze irrigation system performance and conservation options.

Other

Based on rental of 80 acres of land at \$35/acre (one of the water-conservation options expected in the management plan).

Section 9. Key personnel

Kale Gullett, Fishery Biologist I, ½ FTE

Email: gullett@yakama.com

Education

M.S. Rangeland Ecology and Watershed Management/Water Resource Management (Hydrology Emphasis), May 1996, University of Wyoming, College of Agriculture
B.S. Zoology and Physiology/Fisheries Biology, May 1994, University of Wyoming, College of Arts and Sciences

Employer

Yakama Nation Fisheries Resource Management Program

Current Responsibilities

Research, management and restoration of stream ecology and fisheries resources of the Toppenish Creek basin, Yakama Indian Reservation; in-house Instream Flow Incremental Methodology (IFIM) technical experience base for recommendation and evaluation of Reservation instream flows; YIN SOAC alternate; *Acquavella* Task Force; member of Toppenish Creek Corridor Enhancement Plan writing and technical team; evaluation of hydraulic effects of proposed riverine modifications; field, computer and technical assistance for other Program employees.

Employment History

Miller Ecological Consultants, Inc., Fort Collins, Colorado.

Research Technician, August 26, 1996 to December 1, 1996. Assisted in Colorado River Squawfish (endangered) radio telemetry project to determine late-summer microhabitat preferences for instream/passage flow determination.

USDA-US Forest Service Rocky Mountain Region Fish Habitat Relationships Unit, Laramie, Wyoming.

Research Associate I, May 11, 1996 to August 1, 1996. Field and lab application of IFIM for completion of instream fishery flow recommendation reports to Regional Forester, Denver, CO.

University of Wyoming Department of Rangeland Ecology and Watershed Management and Wyoming Water Resources Center, Laramie, Wyoming.

Graduate Research Assistant, September, 1994 to May, 1996. Evaluation of the relationship of fish habitat hydraulics to a region-wide habitat capability criterion.

USDA-US Forest Service Rocky Mountain Forest and Range Experiment Station, Laramie, Wyoming.

Research Fisheries Technician, Summer 1992 and 1993. Collection of fisheries, habitat and hydrology data for Colorado River Cutthroat (sensitive) trout migration project.

Expertise

Education and applied experience mainly in the field of instream flow application and research, evaluation of riverine fishery hydraulics and habitat, hydraulic modeling, stream ecology and hydrology, watershed management and fisheries biology and management.

Publications

Gullett, K.A., T.A. Wesche, R.N. Schmal and W.A. Hubert. 1998. Comparison of salmonid habitat availability to streamflow characteristics in the central Rocky Mountains: Some insights for water resource decision-makers. *Regulated Rivers: Research & Management*, in preparation.

Gullett, K.A., T.A. Wesche and R.N. Schmal. 1998. Evaluation of the USFS Rocky Mountain Region 2 40% standard habitat capability criterion. USFS National Fish Habitat Relationships Unit *Currents*, GPO, Washington, D.C., in progress.

Wesche, T.A. and K. A. Gullett. 1996. Bypass (instream) fishery flow recommendations for Cow Creek below Overland Ditch Diversion, Colorado. Completion report to Rocky Mountain Regional Forester, Denver CO, to fulfill Interagency Agreement #1102-0001-94-041 between the USDA-US Forest Service and University of Wyoming Cooperative Extension Service.

Section 10. Information/technology transfer

The purpose of this project is to provide a basis for and to develop a fish restoration plan for Ahtanum Creek which addresses water withdrawal, instream flow and channel and floodplain habitat quality. Information will be transferred first and foremost to the implementation effort. For outside consumption a completion (annual) report will be submitted to Bonneville at the close of the project year. Excerpted data will be appropriately formatted and submitted to the Northwest Aquatic Information Network (StreamNet) and made available to the public via the Internet.

Congratulations!